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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/608,281	HARRES, DANIEL N.	
	Examiner	**Art Unit**	
	LI LIU	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 March 2009.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 5,8-10,12-14,16,17,19,24,26-29,31-33,35,37,39,40 and 42-45 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 24,26-29 and 31 is/are allowed.

6)☒ Claim(s) 5,8-10,12-14,16,17,19,32,33,35,37,39,40 and 42-45 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 July 2007 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 16, 32 and 44 have been considered but are moot in view of the new ground(s) of rejection.

1). Applicant’s argument – Base claim 32 has been amended for clarity. Amended base claim 32 still recites the subject matter of claim 43, except for the feature "determining at least one of a presence or an absence of light at the receiver." Given that claim 43 contains allowable subject matter, the undersigned does not understand why claim 32 is not allowed. Clarification is respectfully requested.

Examiner’s response – In the previous Non-Final Office Action, the Examiner indicated "Claims 40 and 43 would be allowable if rewritten … to include all of the limitations of the base claim and any intervening claims”. Except for the feature "determining at least one of a presence or an absence of light at the receiver", the newly amended claim 32 also does not include all of the limitations of the base claim. E.g., the limitations “providing a feedback loop to increase a dynamic range of the receiver when an optical signal is high” and “comparing the noise level with a threshold value, the threshold value being at a point where a breakdown voltage of the receiver is eminent” and “adjusting at least one of an amplification of the optical signal and a gain of the receiver based on the noise level” are not in the newly amended claim 32.

Claim Objections

2. Claim 42 is objected to because of the following informalities: line 2, “a gain of the receiver based is reduced” should be changed to “a gain of the receiver is reduced”. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 43 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 43 recites the limitation "the average noise energies" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arnon et al (US 2002/0114038) in view of Harres (US 6,128,112) and Nakano (US 6,795,675).

1). With regard to claim 16, Arnon et al discloses an optical system, comprising:

a transmitter (e.g., Figure 4, the emitter 52) configured to transmit an optical signal;

a receiver including an avalanche photodiode (Avalanche Photodiode 150 in Figure 3) configured to receive the optical signal and to output an electrical signal; and

a monitoring component (the Detector 154 and Controller 156 in Figure 3) for preventing breakdown of the avalanche photodiode ([0010] and [0239], the system of Arnon shown in Figure 3 is used to increase the dynamic range of the receiver "so that the saturation of the APD, due to too high a level of the carrier or of the noise level, is prevent"), the component

monitoring a noise level of at least a portion of the electrical signal (the monitoring signal is part of the electrical signal split from the output of amplifier 152, Figure 3), and

reducing at least one of an amplification of the transmitter and a gain of the receiver (page 10-11, [0237]-[0239], the gain of the APD is set according to the optical power level, the background noise level, and the aggregate noise).

But, Arnon et al does not expressly disclose: monitoring a noise level including determining a presence or absence of the optical signal at the receiver, computing at least one of a high state means and a low state means of the electrical signal, computing an average noise energy for the high-state A, computing an average noise energy for the low-state –A, and computing a ratio of the average noise energies for the hiqh- and Low state A, -A, and reducing at least one of an optical amplification of the

transmitter and a gain of the receiver when the ratio is greater than a predetermined threshold.

However, Harres, in the same field of endeavor, discloses an optical receiver with a monitoring component: monitoring a noise level including determining a presence or absence of the optical signal at the receiver (column 3 line 2-33, and Figure 3, “light” and “dark”, or high state and low state, is determined), computing at least one of a high state means and a low state means of the electrical signal (Figure 3, the powers of the signals at high and low states are calculated), computing an average noise energy for the high-state A, computing an average noise energy for the low-state –A (38 and 40 in Figure 3, column 10 line 11-40), and computing a ratio of the average noise energies for the high- and Low state A, -A (42 in Figure 3, column 10 line 11-40).

With regard to the predetermine threshold, since Arnon teaches to calculate the noise level and use the calculation to control the gain of the APD, it is obvious that a reference value or threshold is used in Arnon’s system to make a decision to adjust the gain. For control purpose, a criterion must be used to judge the level of the signal/noise so to control the operation of the device being controlled. Another prior art, Nakano, discloses a feedback control circuit (Figures 1 and 2), which uses a reference voltage/threshold to control the gain of the APD. Another prior art, Nakano, discloses a feedback control circuit (Figures 1 and 2), which uses a reference voltage/or predetermined threshold to control the gain of the APD. Nakano teaches “[t]he alarm circuit 7 receives the noise detection signal 105, counts the noise pulses generated within a predetermined period, and outputs an alarm pulse 107 when the number of the

counted noise pulses reaches a preset value. When the level of the optical signal input to the APD 2 is lowered or becomes zero, the APD 2 increases the amplification factor of the optical signal based on the control signal from the feedback control circuit 4".

Harres teaches that ratio of the average noise energies is used for calculating a weight factor. Nakano teaches that the gain of the receiver can be controlled based on a predetermined threshold of a noise level. And Nakano discloses that the circuit for monitoring the optical signal level may be readily integrated and detect the reduction in the optical signal level or break in the optical signal with reliability (column 5, line 59-65); and compared with other procedure, Nakano's circuit is not "complex" (column 1, line 46-48). Harres provide a more reliable method and apparatus for detecting and decoding digital signals; and "[i]t is a further object of the invention to provide a method and apparatus for reliably detecting low level signals by increasing the gain of the detector without unduly increasing the bit error rate".

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the ratio of the average noise energy states and a predetermined threshold as taught by Harres and Nakano to the system of Arnon et al so that the gain is adjusted when a ratio of the average noise energies for the high- and low-states is greater than a predetermined threshold, and then the gain of the APD can be better controlled and the signal quality and reliability can be improved.

2). With regard to claim 19, Arnon et al and Harres and Saunders and Nakano disclose all of the subject matter as applied to claim 16 above. And Arnon et al further disclose wherein the monitoring component is configured to monitor an output voltage of

the electrical signal and to adjust at least one of an amplification of the transmitter (Figures 2-5 and 12 etc, [0237]-[0239], [0241] and [0268] etc., the feedback signal is sent to the transmitter to adjust the power level of the transmitter) and a gain of the receiver to maintain a desired RMS level of a electrical signal (Harres: column 10, line 11-28).

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arnon et al and Harres and Nakano as applied to claim 16 above, and in further view of Tomooka et al (US 6,266,169).

Arnon et al and Harres and Nakano disclose all of the subject matter as applied to claim 16 above. But, Arnon et al Arnon et al and Harres and Saunders and Nakano do not expressly disclose wherein the transmitter includes a optical amplifier.

However, Tomooka et al discloses a transmitter including an optical amplifier (e.g., Figure 1, the optical amplifier 14). The optical amplifier is a well known device in the optical communications, Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a optical amplifier in the system of Arnon et al and Harres and Nakano so that the required input optical power can be obtained, and noise can be better controlled and the signal quality can be improved.

8. Claims 32, 33, 35, 37, 39, 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arnon et al (US 2002/0114038) in view of Harres (US 6,128,112) and Saunders (US 6,259,542) and Nakano (US 6,795,675) and Pulice (US 5,270,533).

1). With regard to claim 32, Arnon et al disclose a method of controlling an output of an optical system, the method comprising:

receiving an optical signal with a receiver (Avalanche Photodiode 150 in the opto-electric transducer 162 receives optical signal, Figure 3);

using a photodiode (Avalanche Photodiode 150 in Figure 3) of the receiver to convert the optical signal to a corresponding electrical signal (Avalanche Photodiode 150 converts optical signal into an electrical signal, Figure 3);

computing noise in the electrical signal (the monitoring signal is part of the electrical signal split from the output of amplifier 152, Figure 3; the gain of the APD is set according to the optical power level, the background noise level, and the aggregate noise, [0036] and [0237]-[0239], that is, the noise level is evaluated or calculated by the CPU and controller), and adjusting gain of the photodiode as a function of the computed noise (page 10-11, [0237]-[0239], the gain of the APD is set according to the optical power level, the background noise level, and the aggregate noise) without measuring a temperature of the environment (in Arnon's system, no temperature controlling/monitoring devices are used); and

computing a ratio of high- and low states to prevent breakdown of the photodiode and possible interruption of the receiver ([0016], [0110], [0237]-[0239], [0250], [0291] , the optical power level, the background noise level, the aggregate noise, and the signal to noise ratio are calculated, the gain is controlled so to prevent saturation of the APD).

But, Arnon does not expressly state: computing the ratio of high- and low states to prevent breakdown of the photodiode and possible interruption of the receiver

including: computing an average energy for a high-state A of the electrical signal; computing an average energy for the low-state –A of the electrical signal; and comparing a ratio of the average energies for the high- and low-states A, -A with a threshold value; and the receiver is in an environment exhibiting significant variation in temperature.

Regarding to compute an average energy, Harres, in the same field of endeavor, discloses a method to control an output of an optical receiver, in which an average energies for the high-state and low state (column 3 line 2-33) of the electrical signal are computed (34 and 36 of Figure 3). And Harres teaches that the signal-to-noise ratio can be used for calculating weight factor (column 8 line 61-65). And another prior art, Saunders uses a ratio between a detected energy level of a soliton pulses and a detected energy level of the dispersive wave for controlling the gain of an amplifier (Figures 3 and 4, column 5, line 48-58, column 6 line 26-37, and column 7, line 31-49). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the ratio of the average energies for the high- and low-states to control the gain of the APD.

Regarding to the threshold value, since Arnon teaches to calculate the noise level and use the calculation to control the gain of the APD, it is obvious that a reference value or threshold is used in Arnon's system to make a decision to adjust the gain. For control purpose, a criterion must be used to judge the level of the signal/noise so to control the operation of the device being controlled. Another prior art, Nakano, discloses a feedback control circuit (Figures 1 and 2), which uses a reference voltage/threshold to

control the gain of the APD. And Nakano also teaches “[t]he alarm circuit 7 receives the noise detection signal 105, counts the noise pulses generated within a predetermined period, and outputs an alarm pulse 107 when the number of the counted noise pulses reaches a preset value. When the level of the optical signal input to the APD 2 is lowered or becomes zero, the APD 2 increases the amplification factor of the optical signal based on the control signal from the feedback control circuit 4”.

Nakano discloses that the circuit for monitoring the optical signal level may be readily integrated and detect the reduction in the optical signal level or break in the optical signal with reliability (column 5, line 59-65); and compared with other procedure, Nakano's circuit is not “complex” (column 1, line 46-48).

Arnon and Nakano disclose a feedback control circuit which uses a reference voltage/or predetermined threshold to control the gain of the APD. Harres provides a reliable detection and decoding method even at low power levels. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the ratio of the energy states and a predetermined threshold as taught by Harres and Saunders and Nakano to the system of Arnon et al so that the gain of the APD can be better controlled and the signal quality and reliability can be improved.

Regarding to the receiver in an environment exhibiting significant variation in temperature, the combination of Arnon et al and Harres and Saunders and Nakano discloses a receiver with feedback and automatic gain control and wide dynamic range, and the gain control prevents the saturation of the APD. Anther prior art, Pulice, discloses that the APD with the automatic gain control allows for a wide range of light

levels and can operate under extreme temperature (Abstract, column 1 line 45-50, column 3 line 19-26). Since combination of Arnon et al and Harres and Saunders and Nakano discloses a APD with feedback and automatic gain control and wide dynamic range, it would have been obvious to one of ordinary skill in the art that the receiver of the combined Arnon et al and Harres and Nakano can also be used in an environment exhibiting significant variation in temperature.

2). With regard to claim 33, Arnon et al and Harres and Saunders and Nakano and Pulice disclose all of the subject matter as applied to claim 32 above. And Arnon et al further discloses the method further including transmitting (e.g., Figure 4, the emitter 52) the optical signal to the receiver (Figure 4).

3). With regard to claim 35, Arnon et al and Harres and Saunders and Nakano and Pulice disclose all of the subject matter as applied to claim 32 above. And Arnon et al and Harres and Saunders and Nakano and Pulice further disclose wherein at least one of an amplification of the transmitter (Figures 2-5 and 12 etc, [0237]-[0239], [0241] and [0268] etc., the feedback signal is sent to the transmitter to adjust the power level of the transmitter) and a gain of the receiver is adjusted to maintain a desired RMS level of a electrical signal (Harres: column 10, line 11-28).

4). With regard to claim 37, Arnon et al and Harres and Saunders and Nakano and Pulice disclose all of the subject matter as applied to claim 32 above. And the combination of Arnon et al and Harres and Saunders and Nakano and Pulice further discloses wherein an avalanche photodiode (e.g., Arnon: Figure 3, APD 158) is used to

convert the optical signal, and the ratio is compared with a predetermined threshold (refer to claim 32 rejection above).

But, Arnon et al does not expressly disclose wherein the ratio is compared to breakdown threshold of the avalanche photodiode.

As discussed above, Arnon teaches to calculate the noise level and use the calculation to control the gain of the APD, a reference value or threshold must have been used in Arnon's system to make a decision to adjust the gain, and Nakano discloses a feedback control circuit (Figures 1 and 2), which uses a reference voltage/threshold for comparing and then to control the gain of the APD.

Pulice also teaches a breakdown threshold of the avalanche photodiode (Figure 2), and "the stabilization biasing circuit for avalanche photodiodes in accordance with the subject invention continuously adjusts the avalanche photodiode voltage to a value just below the avalanche breakdown point. In this manner, the subject stabilization biasing circuit for an avalanche photodiode allows the high optical sensitivity of the avalanche photodiode to be realized over an extreme temperature range of at least -55^{o} C to +125^{o} C".

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the breakdown threshold of the APD in the system of Arnon et al and Harres and Saunders and Nakano and Pulice so that the ratio is compared with the breakdown threshold of the APD, and then the gain of the APD can be better controlled and the signal quality can be improved, and the receiver can be used in an extreme temperature environment.

5). With regard to claim 39, Arnon et al and Harres and Saunders and Nakano and Pulice disclose all of the subject matter as applied to claim 32 above. And Arnon et al and Harres and Saunders and Nakano and Pulice further discloses wherein computing the noise in the electrical signal includes integrating an energy value over a bit interval (Harres: column 7, line 3-23, and Figure 3).

6). With regard to claim 42, Arnon et al and Harres and Saunders and Nakano and Pulice disclose all of the subject matter as applied to claim 32 above. And Arnon et al disclose wherein the monitoring component is configured to reduce at least one of an amplification of the transmitter and a gain of the receiver (page 10-11, [0237]-[0239], the gain of the APD is set according to the optical power level, the background noise level, and the aggregate noise).

Arnon et al does not expressly disclose the gain is reduced when a ratio of an average energy of a high-state A of the electrical signal and an average energy of a low-state A of the electrical signal is greater than a predetermined threshold.

However, as discussed above, Harres discloses a high energy calculation component configured to compute average energies for the high-state and low state (column 3 line 2-33, and 34 and 36 of Figure 3). And Harres teaches that the signal-to-noise ratio can be used for calculating weight factor (column 8 line 61-65). And Saunders uses a ratio between a detected energy level of a soliton pulses and a detected energy level of the dispersive wave for controlling the gain of an amplifier (Figures 3 and 4, column 5, line 48-58, column 6 line 26-37, and column 7, line 31-49). Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to use the ratio of the average energies for the high- and low-states to control the gain of the APD.

Arnon et al and Harres and Saunders and Nakano and Pulice discloses a feedback control circuit which uses a reference voltage/or predetermined threshold to control the gain of the APD. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the ratio of the energy states and a predetermined threshold to the system of Arnon et al and Harres and Saunders and Nakano and Pulice so that the gain is adjusted when a ratio of an average energy of a high-state of the electrical signal and an average energy of a low-state of the electrical signal is greater than a predetermined threshold, and then the gain of the APD can be better controlled and the signal quality can be improved.

7). With regard to claim 43, Arnon et al and Harres and Saunders and Nakano and Pulice disclose all of the subject matter as applied to claim 32 above. And the combination of Arnon et al and Harres and Saunders and Nakano and Pulice further disclose the method comprising determining at least one of a presence or an absence of light at the receiver prior to computing the average noise energies (Harres: Figure 3, column 3 line 2-33, and Figure 3, “light” and “dark”, or high state and low state, is determined prior to computing the average noise energies, refer step 34/36 and 38/40 in Figure 3).

9. Claims 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arnon et al (US 2002/0114038) in view of Pulice (US 5,270,533).

1). With regard to claim 44, Arnon et al discloses an apparatus (Figure 3) operable in an environment exhibiting significant variation in temperature, comprising:

an optical signal transmitter (e.g., Figure 4, the emitter 52); and

an optical signal receiver (Avalanche Photodiode 150 in the opto-electric transducer 162 receives optical signal, Figure 3) for receiving an optical signal from the transmitter, the receiver including a photodiode (Avalanche Photodiode 150 in Figure 3) for converting the optical signal to an electrical signal;

the receiver further including a feedback loop (e.g., Figure 3, the feedback loop 154 ->156 ->158 and then to 150) for monitoring the electrical signal outputted by the photodiode, computing noise in the monitored signal (the monitoring signal is part of the electrical signal split from the output of amplifier 152, Figure 3; the gain of the APD is set according to the optical power level, the background noise level, and the aggregate noise, [0036] and [0237]-[0239], that is, the noise level is evaluated or calculated by the CPU and controller), and adjusting gain of the photodiode as a function of the computed noise (page 10-11, [0237]-[0239], the gain of the APD is set according to the optical power level, the background noise level, and the aggregate noise);

wherein the feedback loop adjusts the gain without using measured temperature of the environment (in Arnon's system, no temperature controlling/monitoring devices are used).

Arnon et al does not expressly state the apparatus is “operable” in an environment exhibiting significant variation in temperature. However, Arnon et al discloses that the receiver has feedback and automatic gain control and wide dynamic

range, and the gain control prevents the saturation of the APD. Another prior art, Pulice, discloses that the APD with the automatic gain control allows for a wide range of light levels and can operate under extreme temperature (Abstract, column 1 line 45-50, column 3 line 19-26). Since Arnon et al discloses a receiver with feedback and automatic gain control and wide dynamic range, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the receiver of Arnon et al and Harres and Nakano can also be "operable" in an environment exhibiting significant variation in temperature.

2). With regard to claim 45, Arnon et al and Pulice disclose all of the subject matter as applied to claim 44 above. Ant, Arnon et al further discloses wherein the photodiode is an avalanche photodiode (Avalanche Photodiode 150 in Figure 3); and wherein the feedback loop computes a ratio of high- and low-states to prevent breakdown of the photodiode and possible interruption of the receiver ([0016], [0110], [0237]-[0239], [0250], [0291] , the optical power level, the background noise level, the aggregate noise, and the signal to noise ratio are calculated, the gain is controlled so to prevent saturation of the APD).

10. Claims 5, 8-10, 12 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arnon et al and Pulice as applied to claim 44 above, and in further view of Harres (US 6,128,112).

1). With regard to claim 5, Arnon et al and Pulice disclose all of the subject matter as applied to claim 44 above. And Arnon et al further disclose wherein the feedback loop adjusts at least one of an amplification of the transmitter (Figures 2-5 and

12 etc, [0237]-[0239], [0241] and [0268] etc., the feedback signal is sent to the transmitter to adjust the power level of the transmitter) and a gain of the receiver.

But, Arnon et al and Pulice do not expressly disclose the adjustment is to maintain a desired RMS level of a electrical signal.

However, Harres discloses a receiver with condition determining component (Harres: column 10, line 11-28), and a gain of the receiver to maintain a desired RMS level of a electrical signal (Harres: column 10, line 11-28).

Harres provides a reliable detection and decoding method. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the condition determining component as taught by Harres to the system of Arnon et al and Pulice so that the gain of the APD can be better controlled and the signal quality and reliability can be improved.

2). With regard to claim 8, Arnon et al and Pulice disclose all of the subject matter as applied to claim 44 above. But, Arnon et al and Pulice do not expressly disclose wherein the receiver includes an integrate-and-dump circuit that integrates an energy value of the noise over a bit interval.

However, Harres et al discloses an integrate-and-dump circuit that integrates an energy value of the noise over a bit interval (Harres: column 7 line 3 to column 8 line 65, and Figure 3).

Harres provides a reliable detection and decoding method. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the noise calculation scheme as taught by Harres to the system of Arnon et al

and Pulice so that the gain of the APD can be better controlled and the signal quality and reliability can be improved.

3). With regard to claim 9, Arnon et al and Pulice and Harres disclose all of the subject matter as applied to claims 44 and 8 above. And Arnon et al and Pulice and Harres further disclose wherein the receiver includes a subtractor component (Harres: column 10 line 15-20) that receives a state indicator signal (Harres: column 3 line 2-33) and subtracts a high-state +A or a low-state -A state from the electrical signal based on the state indicator signal (Harres: the state indicator determines the states or phase of the optical signal: light (or high) and dark (or low) portions; and power determining means for determining the power of the respective noise portions of the two phase segments, Figure 3, step 38/40, subtract nominal signal power).

4). With regard to claim 10, Arnon et al and Pulice and Harres disclose all of the subject matter as applied to claims 44, 8 and 9 above. And Arnon et al and Pulice and Harres further disclose wherein the noise energy calculation component includes a squaring function that squares an output from the subtractor component and transmits the squared output to the integrate-and-dump circuit (Harres: column 7, line 3-31, and column 10 lines 11-62).

5). With regard to claim 12, Arnon et al and Pulice disclose all of the subject matter as applied to claim 44 above. But, Arnon et al and Pulice do not expressly disclose wherein the feedback loop includes a state means calculation component configured to compute at least one of a high state means and a low state means of the electrical signal

However, Harres, in the same field of endeavor, disclose an optical receiver, which includes a state means calculation component configured to compute at least one of a high state means and a low state means of the electrical signal (column 3 line 2-33, and Figure 3, power determining means for determining the power of the respective noise portions of the two phase segments).

Harres provides a reliable detection and decoding method. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the a state means calculation component as taught by Harres to the system of Arnon et al and Pulice so that the gain of the APD can be better controlled and the signal quality and reliability can be improved.

6). With regard to claim 40, Arnon et al and Pulice disclose all of the subject matter as applied to claim 44 above. But, Arnon et al and Pulice do not expressly disclose wherein computing noise in the electrical signal includes receiving a state indicator signal that indicates a condition of the optical signal, and subtracting a high-state +A or a low-state -A state from the electrical signal based on the state indicator signal.

However, Harres, in the same field of endeavor, disclose an optical receiver with a substractor receiving a state indicator signal (column 3 line 2-33, column 10 line 15-20) that indicates a condition of the optical signal (the state indicator determines the states or phase of the optical signal: light (or high) and dark (or low) portions), and subtracting a high-state +A or a low-state -A state from the electrical signal based on the state indicator signal (step 38/40 in Figure 3, subtract nominal signal power).

Harres provides a reliable detection and decoding method. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the state indicator and subtractor as taught by Harres to the system of Arnon et al and Pulice so that the gain of the APD can be better controlled and the signal quality and reliability can be improved.

11. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arnon et al and Pulice as applied to claims 44 and 45 above, and in further view of Harres (US 6,128,112) and Saunders (US 6,259,542) and Nakano (US 6,795,675).

1). With regard to claim 13, Arnon et al and Pulice disclose all of the subject matter as applied to claims 44 and 45 above. But, Arnon et al does not expressly disclose wherein the feedback loop includes: a high energy calculation component configured to compute an average energy for the high-state A; a low energy calculation component configured to compute an average energy for the low-state -A; and a comparator configured to compare a ratio of the average energies for the high- and low-states A, -A with a predetermined threshold.

However, Harres discloses a high energy calculation component configured to compute an average energy for the high-state A and a low energy calculation component configured to compute an average energy for the low-state -A (column 3 line 2-33, Figure 3, the powers of the signals at high and low states are calculated). And Harres teaches that the signal-to-noise ratio can be used for calculating weight factor (column 8 line 61-65).

And another prior art, Saunders uses a ratio between a detected energy level of a soliton pulses and a detected energy level of the dispersive wave for controlling the gain of an amplifier (Figures 3 and 4, column 5, line 48-58, column 6 line 26-37, and column 7, line 31-49). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the ratio of the average energies for the high- and low-states to control the gain of the APD.

Regarding to the predetermined threshold, since Arnon teaches to calculate the noise level and use the calculation to control the gain of the APD, it is obvious that a reference value or threshold is used in Arnon's system to make a decision to adjust the gain. For control purpose, a criterion must be used to judge the level of the signal/noise so to control the operation of the device being controlled. And another prior art, Nakano, discloses a feedback control circuit (Figures 1 and 2), which uses a reference voltage/or predetermined threshold to control the gain of the APD.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the ratio of the energy states and a predetermined threshold as taught by Harres and Saunders and Nakano to the system of Arnon et al and Pulice so that the gain of the APD can be better controlled and the signal quality and reliability can be improved.

2). With regard to claim 14, Arnon et al and Pulice disclose all of the subject matter as applied to claims 44 and 45 above. But, Arnon et al does not expressly disclose wherein the ratio is a ratio of an average energy of a high-state A of the

electrical signal and an average energy of a low-state A of the electrical signal is greater than a predetermined threshold.

However, Harres discloses an optical receiver compute average energies for the high-state and low state (column 3 line 2-33, Figure 3). And Harres teaches that the signal-to-noise ratio can be used for calculating weight factor (column 8 line 61-65).

Another prior art, Saunders uses a ratio between a detected energy level of a soliton pulses and a detected energy level of the dispersive wave for controlling the gain of an amplifier (Figures 3 and 4, column 5, line 48-58, column 6 line 26-37, and column 7, line 31-49). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the ratio of the average energies for the high- and low-states to control the gain of the APD.

Regarding to a predetermined threshold, since Arnon teaches to calculate the noise level and use the calculation to control the gain of the APD, it is obvious that a reference value or threshold is used in Arnon's system to make a decision to adjust the gain. For control purpose, a criterion must be used to judge the level of the signal/noise so to control the operation of the device being controlled. And another prior art, Nakano discloses a feedback control circuit (Figures 1 and 2), which uses a reference voltage/or predetermined threshold to control the gain of the APD.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the ratio of the energy states and a predetermined threshold as taught by Harres and Saunders and Nakano to the system of Arnon et al and Pulice so that the gain is adjusted when a ratio of an average energy of a high-state

of the electrical signal and an average energy of a low-state of the electrical signal is greater than a predetermined threshold, and then the gain of the APD can be better controlled and the signal quality and reliability can be improved.

Allowable Subject Matter

12. Claims 24, 26-29 and 31 are allowed.

13. Claims 40 and 43 have been amended; and the previously indicated allowability of claims 40 and 43 are withdrawn in view of the new grounds of rejection as set forth above.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Monday-Friday, 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. L./
Examiner, Art Unit 2613
June 28, 2009

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613